PLUMBING TECHNOLOGY

Program of Studies

2014-2015

Learning that works for Kentucky CTE™

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Plumbing Technology

Course Title	Post-Secondary Connection	Valid Course Code	Recommended Grade Level							Recommended Credit
			6	7	8	9	10	11	12	
Basic Plumbing Skills	PLB151	460513						X	X	1
Bathroom Install	PLB161	460514						X	X	1
Fundamentals of Math	MTH100	470818				X	X			.5
Industrial Safety	ISX100	460301				X	X	X		.5
Introduction to Plumbing	PLB150	460511						X	X	.5
Kitchen Install	PLB163	460515						X	X	1
Plumbing Systems	PLB160	460512						X	X	1
Workplace Principles	WPP200	060191						X	X	.5
Digital Literacy	DLC100	060112				X	X	X	X	.5
Personal Finance	BAS120	060170						X	X	.5
Internship	PLB198	460521							X	1
CO-OP	PLB 199	460518							X	1

PLUMBING TECHNOLOGY

Program Description

The Construction Technology programs will prepare students for work in new construction, remodel, and energy auditing industries. Course offerings include everything from entry level trades courses, all the way to national certification. Students will train at the career centers, high schools and at real jobsites. Current and traditional building practices are included, while updated and advanced framing techniques, energy efficiency, health and safety, and sustainability methods are emphasized.

Construction Pre-Apprenticeship courses are included that focus on new construction, carpentry, and other building trades. Students learn about the tools and techniques used in the construction industries. The students may gain skills in Air Conditioning Technology, Building and Apartment Maintenance, Carpentry, Electrical Technology, Masonry and Plumbing. They are also introduced to green building methods and materials. The Building Performance and Energy Assessment courses shift that focus to analyzing existing homes.

Weatherization, Building Performance and Energy Assessment industries are helping families reduce their energy burden, while maintaining comfort and safety. Our students will learn the national standard and protocols for energy auditing, combustion appliance safety, and energy modeling. Successful students are prepared to take the national certification exams for building analysts and energy auditors.

Course offerings are intended to promote career ladders for those just entering the industry, as well as industry professionals looking to stay current. There are multiple certificates and degree options and inter-related disciplines at the Career Centers having articulation agreements with various post secondary institutions.

MODEL COURSE SEQUENCE

PLUMBING TECHNOLOGY

KDE/OCTE Career Pathways Plumbing Technology		
Career Pathway	**Core Courses**	**Elective Courses**
Plumber Apprentice CIP Code: 46.0501.00 *Tests for Certification* * NCCER – Core Curriculum * NCCER – Plumbing Level 1 * KOSSA-Construction Test	* Basic Plumbing Skills460513 * Bathroom Install460514 * Intro to Plumbing460511 * Kitchen Install460515 * Plumbing Systems460512	* Fundamentals of Math 470818 * Industrial Safety 460310 * Workplace Principles 060191 * Digital Literacy 060112 * Internship Education 460521 * CO-OP Education 460518
Plumber Helper CIP Code: 46.0501.01 *Tests for Certification* * NCCER – Core Curriculum * NCCER – Plumbing Level 1 * KOSSA-Construction Test	* Basic Plumbing Skills460513 * Fundamentals of Math470818 * Industrial Safety460301 * Bathroom Install460514 * Plumbing Systems460512 * Intro to Plumbing460511	* Personal finance 060170 * Kitchen Install 460515 * Digital Literacy 060112 * Internship 460521 * CO-OP 460518 * Workplace Principles 060191

SAMPLE CAREER PATHWAY/PLUMBING

SAMPLE

KENTUCKY CAREER PATHWAY/PROGRAM OF STUDY TEMPLATE

Standard 5A - Career Pathway

COLLEGE/UNIVERSITY: **CLUSTER:** Construction

PATHWAY: Plumbing

HIGH SCHOOL (S):   **PROGRAM:** Plumbing

GRADE	ENGLISH	MATH	SCIENCE	SOCIAL STUDIES	REQUIRED COURSES RECOMMENDED ELECTIVE COURSES OTHER ELECTIVE COURSES CAREER AND TECHNICAL EDUCATION			CREDENTIAL CERTIFICATE DIPLOMA DEGREE	Sample Occupations
9	English I	Algebra I	Life Science	Economics	Foreign Language	Health and PE	Digital Literacy		
10	English II	Geometry	Earth and Space Science	U.S. History	Physics	Health and PE	Foreign Language 2		
11	English III	Algebra II	Physical Science	World Geography	Introduction to Plumbing	Basic Plumbing	Industrial Safety		Work Based Learning
12	English IV	4th Math	Health & PE	History and Appreciation of Visual and Performing Arts	Plumbing Systems	Kitrchen Install	Fundamentals of Math	NCCER Student Certification/ Plumber Apprentice	Entry Level Plumbers's A[p[prentice
	Take Compass test - Apply for admission to KCTCS				Student eligible to take ASE exams			*Denotes ONet Certificates	
Year 13	Writing	Math	Science	Computer Applications	Bathroom Install	Basic Blueprint Reading	Workplace reeadiness		
Year 14	Oral Communication	Elective	Humanities	Social Interaction	Internship Education	CO-OP Education	CO-OP Education	Associate of Applied Science in Plumbing Technology	Entry Level Plumber's Apprentice
Years 15-18	Two years of verifiable work experience - Study for, take and pass ASE exams.							NCCER Professional Certification	Entry Level Plumber's Apprentice
Year 19	degree program - Complete Kentucky Teacher								
Years 19-	Complete college work toward the bachelor's degree Professional Education Courses (31 hours) At least 6 hours each year to maintain teaching certificate Maintain industry ASE certifications				Intro to Education	Foundations of CTE	Methods of Teaching		
					Instructional Methods	Evaluation	Human Development		
					Special Education	Student Teaching			
	Related/Technical Courses (33 hours)				Digital Electricity	DC and AC	NOCTI Test		
	43 hours must be in 300 or above level courses				PC Related	PC Networking	Quality Control		
					Methods and Processes	Hydraulics and Pneumatics	CAD		
					PLCs				Bachelor's Degree

	Required Courses
	Recommended Elective Courses
	Other Elective Courses
Funded by the U. S. Department of Education	**Required Career and Technical Education Courses**
(V051B020001)	**Credit-Based Transition Programs (e.g. Dual/Concurrent Enrollment, Articulated Courses, 2+2+2)**
Revised Jan. 2005	**(◆ =High School to Comm. College) (• =Com. College to 4-Yr Institution) (■ = Opportunity to test out)**
October, 2006-CTE/Kentucky	**Mandatory Assessments, Advising, and Additional Preparation**

Note: Categories of courses (e.g. Required, Recommended Electives, other Electives and career and Technical Education) apply to both secondary and postsecondary levels.

	Workplace Principles 060191	

	Course Description	

Workplace Principles examine the changing workforce and the skills needed to adapt to constantly changing demands and expectations. The course includes, but is not limited to, problem solving, teamwork, time management, and self-management skills. Job-seeking and job-retention skills are taught through the development of resumes and job search materials. Maximum benefit is received if this course is taken in the latter part of the student's course work.

	Content/Process	
1	Describe and apply the problem-solving processes independently and in groups	
2	Describe the importance of teamwork and apply teamwork skills	
3	Identify barriers to full team participation (sexual harassment, diversity, Americans with Disabilities Act, inhibiting behaviors)	
4	Apply conflict resolution skills in team situations (i.e., workplace violence)	
5	Describe the importance of time and self-management in the workplace	
6	Describe personal performance skills (i.e., appropriate dress, business protocol, personality traits, customer relations skills, and professional behavior)	
7	Describe the steps to take advantage of transition opportunities (i.e., lifestyle change, employment change)	
8	Develop an employment portfolio including a cover letter, resume, and reference page	
9	Identify sources for job leads and employer contacts	
10	Complete application forms	
11	Prepare and practice for job interviews	
12	Practice job follow-up strategies (job acceptance and job rejection)	
13	Review pre-employment tests	
14	Identify policies and procedures for a drug-free workplace, workers' compensation, Family Medical Leave Act, grievance policy, unemployment compensation, and business ethics	
15	Identify ergonomics and understand why ergonomics is important from a health point of view.	
16	Demonstrate accountability of and the safe and responsible use of company resources, office equipment, machines, etc.	
17	Apply Internet etiquette and safety	

| 18 | Identify safety rules applicable to this course and demonstrate appropriate observance of said rules, including but not limited to, trip hazards, electrical cords and outlets, evacuation procedures for emergency situations (including fire, tornado, bomb threat, earthquake, etc.), lockdown procedures for emergency situations, location and contents of first aid kit, MSDS sheets, etc. | |

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS WPP 200
CTSO's – Skills USA

	Digital Literacy	
	060112	
	Course Description	
	The impact of computers on society, and ethical issues are presented. Students use a microcomputer and application software, including word processing, database, spreadsheets, presentation software, and the Internet, to prepare elementary documents, reports, and electronic presentations.	
	Content/Process	
1	Use a word processing program to create, save, print, modify, spell-check, and grammar-check a simple document	
2	Use a word processing program to enhance the appearance of a simple document by using centered, right-justified, boldfaced, underlined, and italicized text	
3	Use a word processing program to change the default margins and line spacing	
4	Use a word processing program to create a document with headers, footers, and footnotes	
5	Use an electronic spreadsheet to create, save, print, modify, and obtain graphs from a simple spreadsheet.	
6	Use an electronic spreadsheet to perform basic mathematical operations including, but not limited to addition, subtraction, multiplication, and division	
7	Use an electronic spreadsheet to calculate averages and percent's	
8	Use an electronic spreadsheet program to enhance the appearance of a spreadsheet by changing fonts, foreground and background colors; and centering text across columns	
9	Use a database management program to create, maintain, and print reports from a simple relational database	
10	Use a database management program to customize the user interface by creating and maintaining forms and reports	
11	Use a database management program to query tables using basic query operations such as "and", "or", "not", etc.	
12	Print in landscape and portrait orientations	
13	Use the component of the operating system that helps the user manipulate files and folders to copy, move, rename, and delete files; and to create, copy, move, rename, and delete folders	
14	Use a World Wide Web browser to navigate hypertext documents and to download files	

15	Use Internet search engines and understand their advantages and disadvantages	
16	Use an electronic mail program to send and receive electronic mail	
17	Discriminate between ethical and unethical uses of computers and information including e-mail and internet etiquette	
18	Demonstrate a basic understanding of issues regarding software copyright, software licensing, and software copying	
19	Demonstrate an awareness of computer viruses and a basic understanding of ways to protect a computer from viruses	
20	Demonstrate a basic understanding of the impact of computers on society	
21	Use and understand basic computer terminology	
22	Identify types of computers, how they process information and how individual computers interact with other computing systems and devices	
23	Identify the function of computer hardware components	
24	Identify the factors that go into an individual or organizational decision on how to purchase computer equipment	
25	Identify how to maintain computer equipment and solve common problems relating to computer hardware	
26	Identify how software and hardware work together to perform computing tasks and how software is developed and upgraded	
27	Identify different types of software, general concepts relating to software categories, and the tasks to which each type of software is most suited or not suited	
28	Identify what an operating system is and how it works, and solve common problems related to operating systems	
29	Manipulate and control the Windows desktop, files, and disks	
30	Identify how to change system settings, install and remove software	
31	Be able to start and exit a Windows application and utilize sources of online help	
32	Identify common on-screen elements of Windows applications, change application settings and manage files within an application	
33	Describe and implement the protocol of utilizing presentation software.	
34	Use a presentation program to create, save, modify, spell check, and grammar-check a simple presentation.	

35	Deleted Task	

36	Use a presentation program to enhance the appearance of the slide designs, background colors, and layout.	
37	Utilize the print features in a presentation to include handouts, speaker's notes, and black and white.	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS DLC 100
CTSO's – Skills USA

	Industrial Safety 460301	
Course Description	
This course provides practical training in industrial safety. The students are taught to observe general safety rules and regulations, to apply work site and shop safety rules, and to apply OSHA regulations. Students are expected to obtain certification in first aid and cardiopulmonary resuscitation.	
Content/Process	
1	Apply work site and lab safety procedures	
2	Apply personal safety rules and procedures	
3	Apply fire prevention rules and procedures	
4	Obtain first aid certification	
5	Obtain CPR certification	
6	Demonstrate hazardous communications procedures	
7	Describe and demonstrate universal precautions procedures	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS ISX 100
CTSO's – Skills USA

	Personal Finance 060170	
	Course Description	
	Information needed to make intelligent choices and take effective action in the management of personal resources is provided. Topics include financial planning, buying, borrowing, saving, budgeting, investing, insurance, and taxes to personal finances.	
	Prerequisites: None	
	Content/Process	
1	Compare major economic systems in the global economy	
2	Identify sources of consumer information, protection, rights, and responsibilities	
3	Describe the characteristics and services of financial institutions	
4	Demonstrate the use of personal financial statements, budgets, and other financial tools to evaluate financial health.	
5	Identify options available for managing cash and liquid assets	
6	Identify investment opportunities	
7	Compare and evaluate consumer credit	
8	Develop strategies for making smart buying decisions with regard to housing, transportation, and consumer goods	
9	Identify major types of employee benefits	
10	Complete various types of tax forms	
11	Explain basic tax concepts and effective tax minimization strategies	
12	Identify and compare basic types of health, life, auto and homeowner/renter insurance	
13	Explain the basic financial markets and investment options	
14	Explain and discuss contingency planning, including retirement and estate planning	
15	Compute various financial transactions, such as account reconciliation, interest, capital gains, etc.	
16	Identify ergonomics and understand why ergonomics is important from a health point of view	
17	Demonstrate accountability of and the safe and responsible use of company resources, office equipment, machines, etc.	

18	Apply Internet etiquette and safety	
19	Identify safety rules applicable to this course and demonstrate appropriate observance of said rules, including but not limited to, trip hazards, electrical cords and outlets, evacuation procedures for emergency situations (including fire, tornado, bomb threat, earthquake, etc.), lockdown procedures for emergency situations, location and contents of first aid kit, MSDS sheets, etc.	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS BAS 120
CTSO's – Skills USA

	Fundamentals of Mathematics 470818	
	Course Description This course concentrates on basic math and is designed to assist the student in mastering and applying math skills in the areas of whole numbers, fractions, decimals, percentages, basic measurements, simple equations, ratio and proportions, computed measurements, tables and graphs, and use of the hand-held calculator.	
	Content/Process	
1	Without the use of a calculator, perform the fundamental arithmetic operations on whole numbers with accuracy and speed	
2	Without the use of a calculator, perform the fundamental arithmetic operations on fractions with accuracy and speed	
3	Without the use of a calculator, perform the fundamental arithmetic operations on decimals with accuracy and speed	
4	Without the use of a calculator, perform the fundamental arithmetic operations on percentages with accuracy and speed	
5	Perform basic processes in problems dealing with English and metric units of measure	
6	Perform conversions interchanging the English and metric systems of measure with accuracy	
7	Utilize ratio/proportions	
8	Apply basic formulas	
9	Calculate area, volume, and perimeter of basic shapes to include squares, rectangles, and circles	
10	Read and interpret tables and graphs	
11	Use scientific calculators	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS MTH 100
CTSO's – Skills USA

	Introduction to Plumbing 460511	
	Course Description	
	This course introduces the origin and basic principles of the plumbing industry. Also included is the orientation of methods associated with the plumbing industry.	
	Content/Process	
1	Read a ruler	
2	Work with hand tools	
3	Work with power tools	
4	Work with steel pipe, tools, and methods	
5	Learn cast iron pipe methods of cutting	
6	Learn methods of joining cast iron pipe	
7	Work with copper tubing	
8	Learn methods of joining copper pipe	
9	Work with PVC and ABS plastics	
10	Work with PVC and CPVC water pipe	
11	Learn methods of joining different pipe materials	
12	Learn methods of pipe support	
13	Apply for a job	
14	Join copper pipe and fittings using the flaring method	
15	Join copper pipe and fittings using the compression method	
16	Bend copper pipe using spring benders	
17	Cut plastic pipe	
18	Join plastic pipe using the solvent weld and thermo welding methods	
19	Join plastic pipe using insert and threaded fittings	
20	Join pipes of different types	
21	Cut woodwork for drain, waste, and vent pipes	
22	Install fixture supports	

23	Inventory plumbing fixtures and supplies	
24	Secure pipes to wood structures	
25	Secure pipes to concrete structures	
26	Secure pipes to metal structures	
27	Install water hammer arrestors	
28	Install wall hydrants	
29	Install yard hydrants	
30	Thaw frozen water pipes	
31	Insulate water pipes	
32	Apply for a plumbing-related job	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS PLB150
CTSO's – Skills USA

	Basic Plumbing Skills 460513	

Course Description		
This course introduces the student to basic pipe joining techniques.		

Content/Process		
1	Make a measurement with a rule	
2	Measure, cut, ream, and thread steel pipe using hand tools	
3	Measure, cut, and ream steel pipe using power equipment	
4	Join steel pipe and fitting	
5	Cut cast iron using a hammer and chisel and other tools	
6	Cut cast-iron pipe using snap chain cutter or wheel cutter	
7	Join cast-iron pipe and fittings using lead and oakum	
8	Join cast-iron pipe and fittings using a compressed gasket	
9	Join cast-iron pipe using no-hub clamp	
10	Measure and cut copper pipe, using hacksaw and tubing cutters, and ream	
11	Join copper pipe and fittings using soldering method	
12	Join copper pipe and fittings using flare method	
13	Join copper pipe and fittings using compression method	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS WPP 200
CTSO's – Skills USA

Plumbing Systems		
460512		
Course Description		
This course presents a study of designing and sizing water distribution and drain, waste, and vent pipes, in addition to studies of code requirements and installation of common residential fixtures.		
Prerequisite: PLB 150		
Content/Process		
1	Identify drain, waste, and vent	
2	Learn code sizing of DWV	
3	Size a bathroom group	
4	Identify water distribution	
5	Learn the sizes of the water lines for a bathroom group	
6	Learn how to set a water closet	
7	Learn how to set a lavatory	
8	Learn how to install a bathtub	
9	Learn how to install a shower	
10	Learn the sizing of the kitchen and laundry	
11	Learn how to install a kitchen sink unit	
12	Identify auto-washer openings	
13	Learn cross-connections	
14	Install other plumbing fixtures	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS WPP 200
CTSO's – Skills USA

	Bathroom Install 460514	
	Course Description	
	This course will develop the skills necessary to rough-in and install a bathroom group and auxiliary fixtures for residential or commercial applications.	
	Content/Process	
1	Rough in waste and vent pipes for built-in lavatories	
2	Rough in the water supply for lavatory	
3	Install a lavatory	
4	Rough in waste and vent pipes for floor mount water closet	
5	Rough in the water supply for water closet	
6	Install a water closet	
7	Rough in waste and vent pipes for bathtub	
8	Rough in the water supply for bathtub	
9	Install a bathtub	
10	Install urinal and bidet	
11	Rough in waste and vent pipes for shower bath	
12	Rough in the water supply for shower	
13	Install shower bath	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS WPP 200
CTSO's – Skills USA

	Kitchen Install 460515	
Course Description	
This course will develop the skills necessary to rough in and install a kitchen group and laundry fixtures for residential and commercial applications.	
Prerequisite: PLB 151	
Content/Process	
1	Rough in waste and vent pipes for kitchen sink	
2	Rough in the water supply for kitchen sink	
3	Install a kitchen sink	
4	Install garbage disposal unit	
5	Install dishwasher opening	
6	Rough in waste and vent pipes for automatic washer	
7	Rough in the water supply for automatic washer	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS WPP 200
CTSO's – Skills USA

	Internship	
	460521	

Course Description
The Practicum provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Practicum do not receive compensation.

Content/Process		
1	Gain career awareness and the opportunity to test career choice(s)	
2	Receive work experience related to career interests prior to graduation	
3	Integrate classroom studies with work experience	
4	Receive exposure to facilities and equipment unavailable in a classroom setting	
5	Increase employability potential after graduation	

Connections:
*Common Core State Standards
*KOSSA
*Common Core Technical Standards
*New Generation Science Standards
*Post-Secondary: KCTCS CAR 198
CTSO's – Skills USA

	Cooperative Education I	
	460518	

	Course Description	
Cooperative Education provides supervised on-the-job work experience related to the student's educational objectives. Students participating in the Cooperative Education program receive compensation for their work.		

	Content/Process	
1	Gain career awareness and the opportunity to test career choice(s)	
2	Receive work experience related to career interests prior to graduation	
3	Integrate classroom studies with work experience	
4	Receive exposure to facilities and equipment unavailable in a classroom setting	
5	Increase employability potential after graduation	
6	Earn funds to help finance education expenses	
	Connections *Secretary's Commission on Achieving Necessary Skills (SCANS) *National Center for Construction Education Research (NCCER) *21st Century Skills *Common Core State Standards ELA and Math *Interdisciplinary Course	